CLAIMS

1. Method for separating entrained particles from a gas in a fluidised bed reactor system which comprises a separation region defined by a cylindrical r-,φ-,z-coordinate system, the method comprising the consecutive steps of:

- leading the gas in the z-direction (axial direction),
- diverting the gas to flow substantially in the r-direction (radial direction), while keeping the gas circumferentially distributed in rφ-planes, which means that the gas is allowed to flow to and/or from substantially the whole circumference of the separation region in said rφ-planes, and
- mechanically separating the particles from the gas while the gas is flowing substantially in the r-direction.

2. Method according to claim 1, comprising the further steps of:

- causing the gas having flown in said r-direction to flow in the reversed r-direction,
- mechanically separating the particles from the gas while the gas is flowing in the reversed r-direction, and
- optionally, further reversing the direction of gas flow and mechanically separating the particles from the gas as above.

3. Method according to claim 1 or 2, wherein in said cylindrical coordinate system (r,φ,z) the gas is initially directed from a larger r-value towards a smaller r-value, for the first separation step, and wherein after all separation steps have been performed the gas, having been directed towards a smaller r-value in the last separation step, is led away in the z-direction.

4. Method for separating entrained particles from a gas in a fluidised bed reactor system, comprising the steps of:

- causing the gas to flow in a stacked multileveled flow with consecutive particle separation levels X_N (X_1,X_2,X_3,…,X_n…), N being an integer,
- directing the gas to flow in a first direction on the first level X_1,
- bringing the gas to the next level X_2 from said first level X_1,
- directing the gas to flow in a direction reversed to said first direction on said next level X_2, so as to create a doubled-back flow path,
- optionally, bringing the gas to additional particle separation levels, so as to cause the gas to flow in the first direction on levels with odd-numbered N and in the reversed direction on levels with even-numbered N, and
- mechanically separating the particles from the gas on each level.

5. Method according to claim 4, in which the gas is caused to flow from a centre zone to a cirumference of said centre zone or vice versa, whereby said directions are essentially radial directions in respect of the centre zone and the circumference associated thereto.

6. Fluidised bed reactor system including a particle separator for separating entrained particles from a gas having a flow path, comprising a set of non-centrifugal mechanical separator elements disposed in the flow path of the gas, so that the gas is able to pass between the separator elements while the inertia of the particles directs them to the separator elements upon which they impinge and are separated and removed from the gas flow, c h a r a c t e r i s e d i n that the set of separator

elements is arranged in a configuration having a centre zone with a centre axis, and a circumference, wherein directional means are provided for directing the gas so that gas passing through the set of separator elements flows from the circumference to the centre zone of the configuration or vice versa.

7. System according to claim 6, in which said set of separator elements is arranged as a structure having consecutive particle separation levels X_N (X_1,X_2,X_3,…,X_n…), N being an integer, wherein said directional means are arranged at the circumference and at the centre zone of the configuration, so as to cause the gas to flow through the set of separator elements in one direction on levels with odd-numbered N and in the reversed direction on levels with even-numbered N.

8. Fluidised bed reactor system including a particle separator for separating entrained particles from a gas having a flow path, comprising a set of non-centrifugal mechanical separator elements disposed in the flow path of the gas, so that the gas is able to pass between the separator elements while the inertia of the particles directs them to the separator elements upon which they impinge and are separated and removed from the gas flow, c h a r a c t e r i s e d i n that said set of separator elements is arranged as a structure having consecutive particle separation levels X_N (X_1,X_2,X_3,…,X_n…), N being an integer, wherein directional means are arranged to cause the gas to flow through the various levels of the structure in one direction on levels with odd-numbered N and in the reversed direction on levels with even-numbered N.

9. System according to claim 8, in which said set of separator elements is arranged in a configuration having a centre zone with a centre axis, and a circumference,

wherein said directional means are located at the circumference and at the centre zone of the configuration, so as to cause the gas to pass through the set of separator elements from the circumference to the centre zone of the configuration or vice versa.

10. System according to any one of claims 6, 7 or 9, wherein said configuration has a generally cylindrical shape, preferably with the separator elements being arranged essentially symmetrically.

11. System according to any one of claims 6-10, wherein the separator elements have an elongated shape and extend essentially in parallel with the centre axis.

12. System according to any one of claims 6-11, wherein said separator elements are channel-shaped beams having an essentially U-shaped cross-section, wherein the beams are arranged so that the particles impinge upon the bottom of the U and then fall down, guided by the channel-shaped beam, to be collected.

13. System according to any one of claims 6-12, in which said set of separator elements forms a number of ring-shaped arrays being placed within each other.

14. System according to claim 13, in which the separator elements of an array are circumferentially displaced with respect to the separator elements of an adjacent array.

15. System according to claim 12, or any one of claims 13-14 when dependent of claim 12, in which each U-shaped beam is provided with a respective additional U-shaped beam attached in parallel thereto, each of the additional U-shaped beams being provided with a respective further U-shaped beam separator element

attached in parallel thereto, forming a unit with three U-shaped beam channels, dividing plates being inserted in at least two U-shaped beam channels for mechanical segregation of said channels and a section of at least one of the elements in the unit being removed, so as to create three particle separation levels of impinge areas, one for each element in the unit, wherein said directional means are arranged to direct the gas in alternating level directions.

16. System according to any one of claims 6-15, wherein the particle separator is located inside a reactor, preferably at the upper portion thereof, and wherein said centre axis is in parallel with the axis of the reactor, preferably co-axially.

17. System according to any one of claims 6-16, wherein said configuration is circular cylindrical.

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